

TRANSITWAY CORRIDOR FEASIBILITY STUDY



High Capacity Transit Corridor Work Group
January 20, 2011 Meeting
Corridor C Transitway Alignment Alternatives

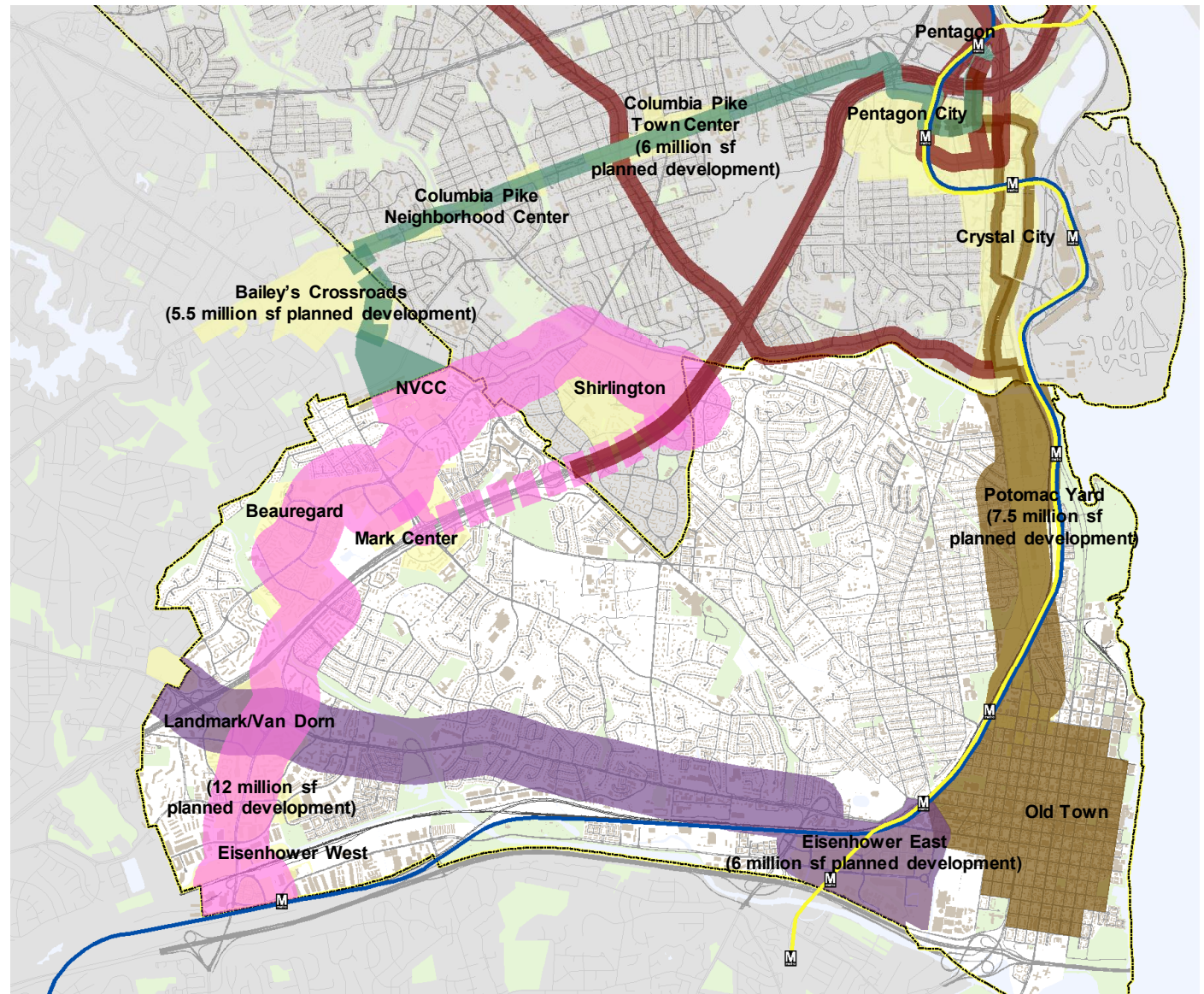


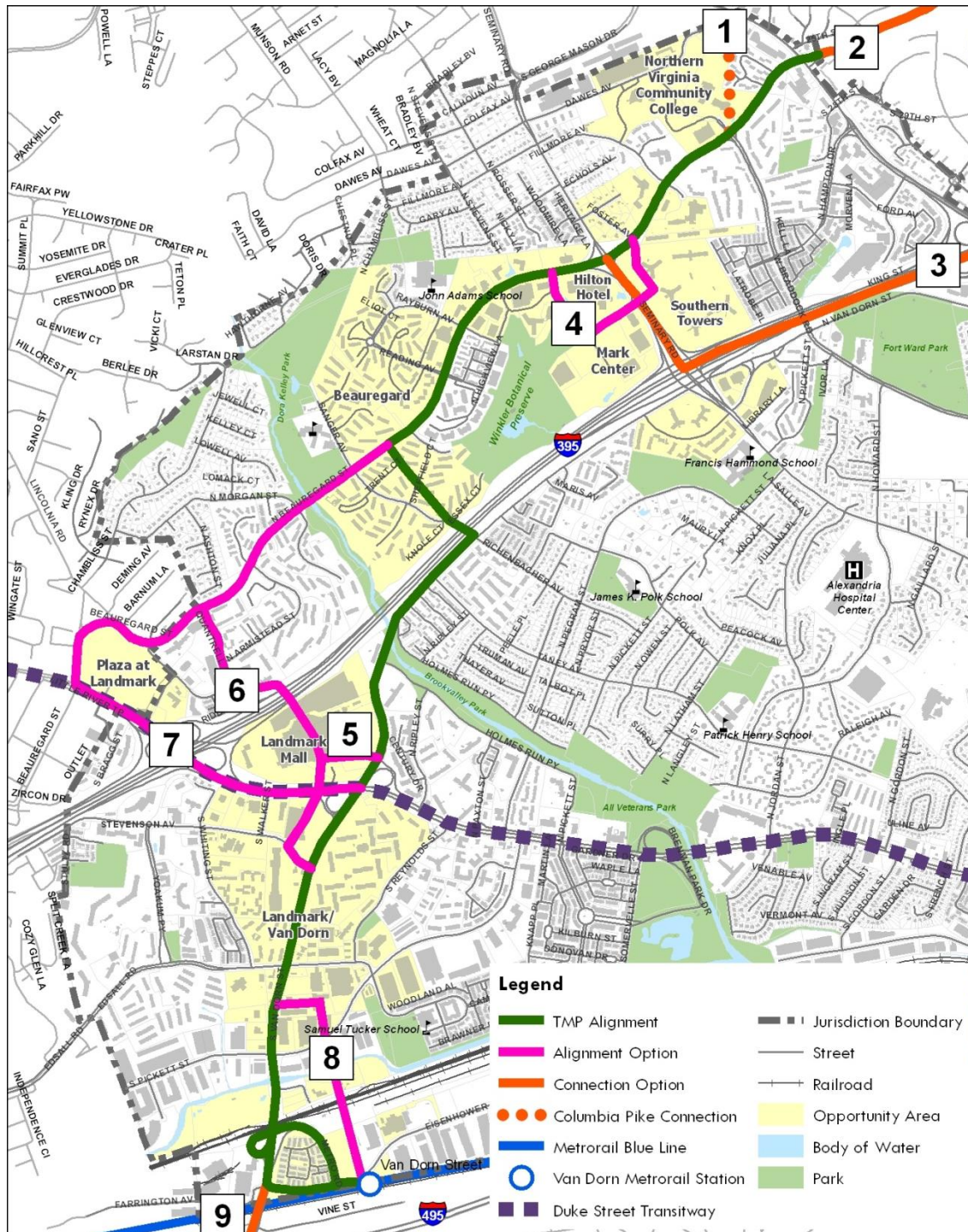
Kimley-Horn
and Associates, Inc.

Regional Context

Regional Destinations

- Bailey's Crossroads
- Beauregard
- Columbia Pike
- Crystal City
- Eisenhower East
- Eisenhower West
- Kingstowne
- Landmark/Van Dorn
- Mark Center
- Metrorail: Blue and Yellow Lines
- NOVA Community College (NVCC)
- Old Town
- Pentagon
- Pentagon City
- Potomac Yard
- Shirlington





Preliminary Connection and Alignment “Kit of Parts”

Northern Connection Options

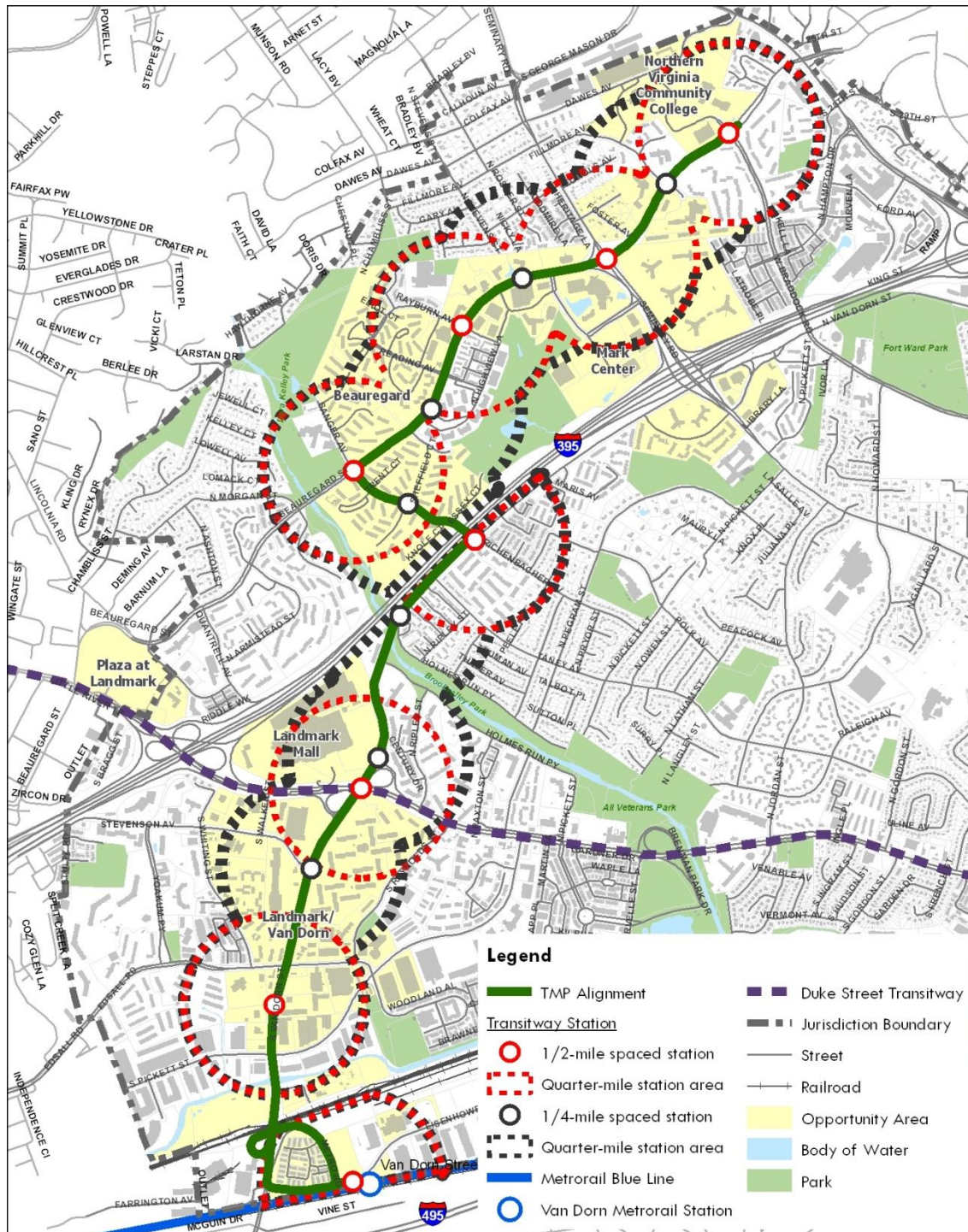
1. Columbia Pike via NOVA (alignment under discussion)
2. Shirlington/Pentagon via Beauregard
3. Pentagon via I-395

Alignment Options

4. Mark Center/Southern Towers
5. New High Street (Landmark Mall)
6. New High Street/Quantrell Avenue
7. Landmark Plaza/Beauregard Street
8. Multimodal Bridge to Van Dorn Metrorail Station

Southern Connection Option

9. Kingstowne via Van Dorn



Preliminary Station “Kit of Parts”

- This diagram illustrates conceptual station spacing along a general alignment
- Actual station locations and a proposed alignment are not shown
- Actual station locations will depend on physical conditions, locations of key origins and destinations, land use type and intensity, and transit mode technology
- 1/4-mile spacing does not significantly increase transit coverage

Transit Modes

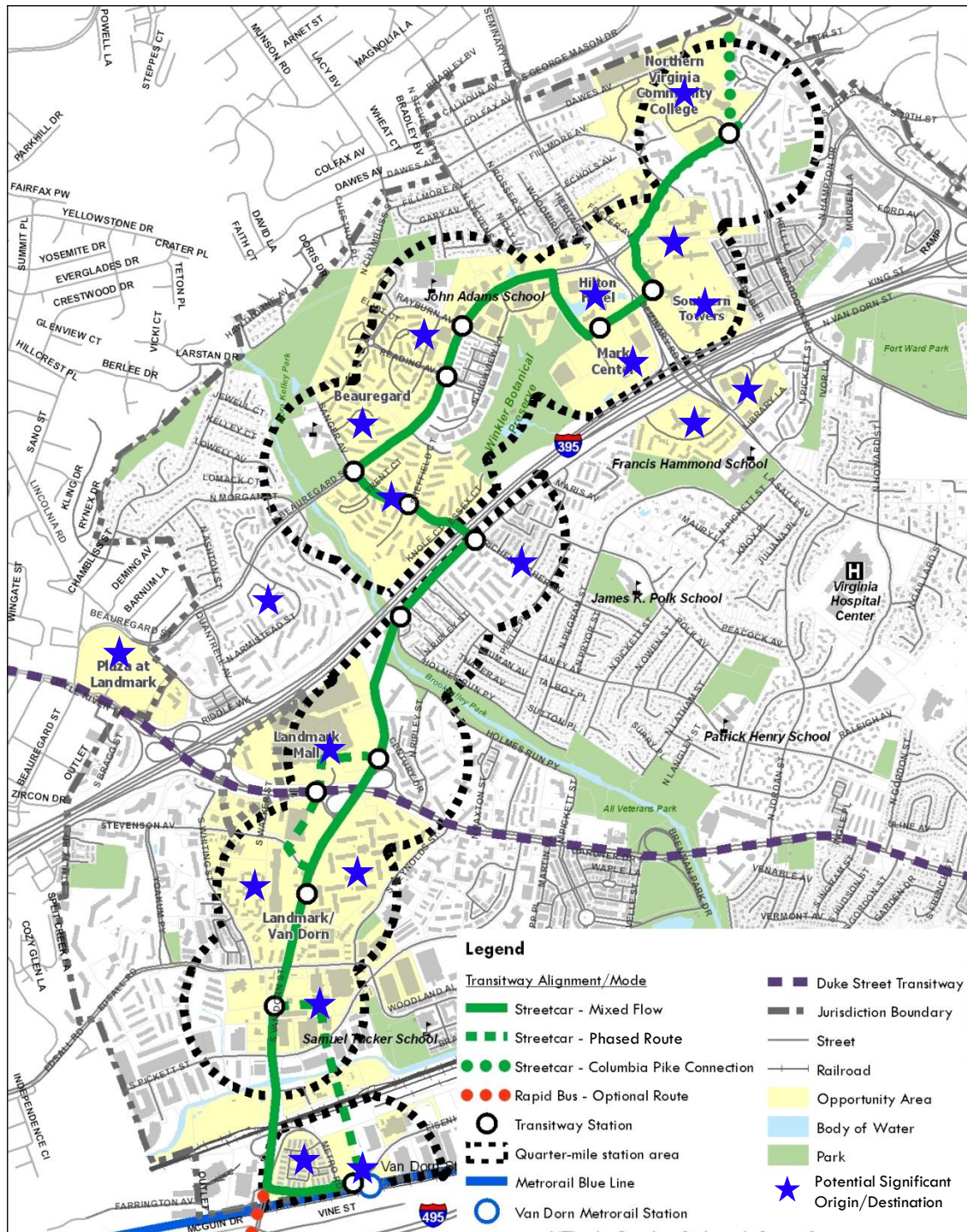
Transit Mode	Runningway Elements	Approximate Station Spacing
Rapid Bus	<ul style="list-style-type: none"> • Mixed flow • Transit signal priority (TSP) • Queue jump lanes at significant intersections 	1/4-mile
Streetcar in Mixed Flow	<ul style="list-style-type: none"> • Mixed flow • Transit signal priority (TSP) 	1/4-mile
Bus Rapid Transit (BRT)	<ul style="list-style-type: none"> • Combination of dedicated lanes and mixed flow • Transit signal priority (TSP) • Queue jump lanes at intersections without dedicated lanes 	1/2-mile
Streetcar in Dedicated Lanes	<ul style="list-style-type: none"> • Dedicated lanes • Transit signal priority (TSP) 	1/2-mile

Preliminary Screening Criteria

Preliminary Screening Criteria	Description
Service to Regional Destinations	Key destinations served
Service to Population, Employment, and Retail in the Corridor	Population, employment, retail, and key destinations served
Transit Connectivity	Access to other transit services (existing and planned)
Transit Travel Time	Relative speed of transit along the Van Dorn/Beauregard corridor
Alignment Quality	Geometric quality of alignment
Property Impacts	Number, use type, and quantity of properties impacted with anticipated level of impact (ROW only, partial take, total take)
Traffic Flow Impact	Effect of transit implementation on general vehicle flow (non-transit) in corridor
Capital Cost	Comparative capital cost for initial system construction

Detailed Evaluation Criteria

General Evaluation Criteria Grouping	Criteria Sub-Group	Evaluation Criteria	For Use in Preliminary Screening of Concepts	For Use in Comparative Evaluation of Concepts	Measurement Method
Effectiveness - Addresses stated transportation issues in the corridor	Coverage	Service to Population, Employment, and Other Destinations	✓	✓	Tabulate population, employment, key destinations, and similar, served by option
		Transit Connectivity	✓	✓	Access to other transit services (existing and planned)
	Operations	Running-way Configuration(s)		✓	Quantify amount of runningway that is dedicated and amount that is mixed flow
		Corridor Length		✓	Measured length of the corridor (mi or feet)
		Capacity		✓	Potential corridor capacity (hourly) based on mode technology, headways, and other conditions
		Interoperability		✓	Identification of whether the chosen runningway configuration and transit mode technology are compatible with regionally planned systems
		Avoidance of Congestion		✓	Number and locations of LOS E/F intersections avoided
		Transit Travel Time	✓	✓	Transit travel time
		Intersection Priority		✓	Percent of intersections where TSP is needed and can be implemented successfully - notation of where it cannot be implemented successfully
		Ridership		✓	Forecast number of riders
	Alignment	Geometrics	✓	✓	Geometric quality of alignment
		Runningway Status		✓	Percent of corridor to be located on new or realigned roadway
	Phasing	Phasing		✓	Identification of ability to phase operations and implementation
Impacts - Extent to which economics, environment, community, transportation are affected	Economic	Development Incentive		✓	Perceived value of transit mode technologies with regard to development potential
	Natural Environmental	Natural Environment		✓	Summary of key environmental conditions affected (wetlands, floodplains, T&E, streams, and similar)
		Parks and Open Space		✓	Summary of parks and/or open spaces affected
	Neighborhood and Community	Property	✓	✓	Number, use type, and quantity of properties impacted with anticipated level of impact (ROW only, partial take, total take)
		Streetscapes		✓	Impact to existing streetscapes
		Community Resources		✓	Identify number and location of historical, cultural, community, archaeological resources affected
		Demographics		✓	Identification of impacts to special populations
		Noise and Vibration		✓	Summarize relative noise and vibration impacts of different mode types and corridor configurations
	Transportation	Traffic Flow Impact	✓	✓	Effect of transit implementation on vehicular capacity of corridor
		Traffic Signals		✓	Number of existing signalized intersections affected by transit, identification of need for new signal phases, and number/location of new traffic signals needed to accommodate transit
		Multimodal Accommodation		✓	Impacts to, and ability to accommodate bicycles and pedestrians
		Parking		✓	Impacts to parking
Cost Effectiveness - Extent to which the costs are commensurate with their benefits	Cost	Capital cost	✓	✓	Order of magnitude capital cost for corridor (stations, runningway, etc.)
		Operating cost		✓	Order of magnitude operating cost
		Cost Per Rider		✓	Order of magnitude cost per rider
Financial Feasibility - Cost of system/concept is in alignment with available funding	Funding	Funding		✓	Availability to specific funding sources
		Private Capital Incentive		✓	Judgment as to whether the concept has the potential to attract private capital investment and innovative procurement

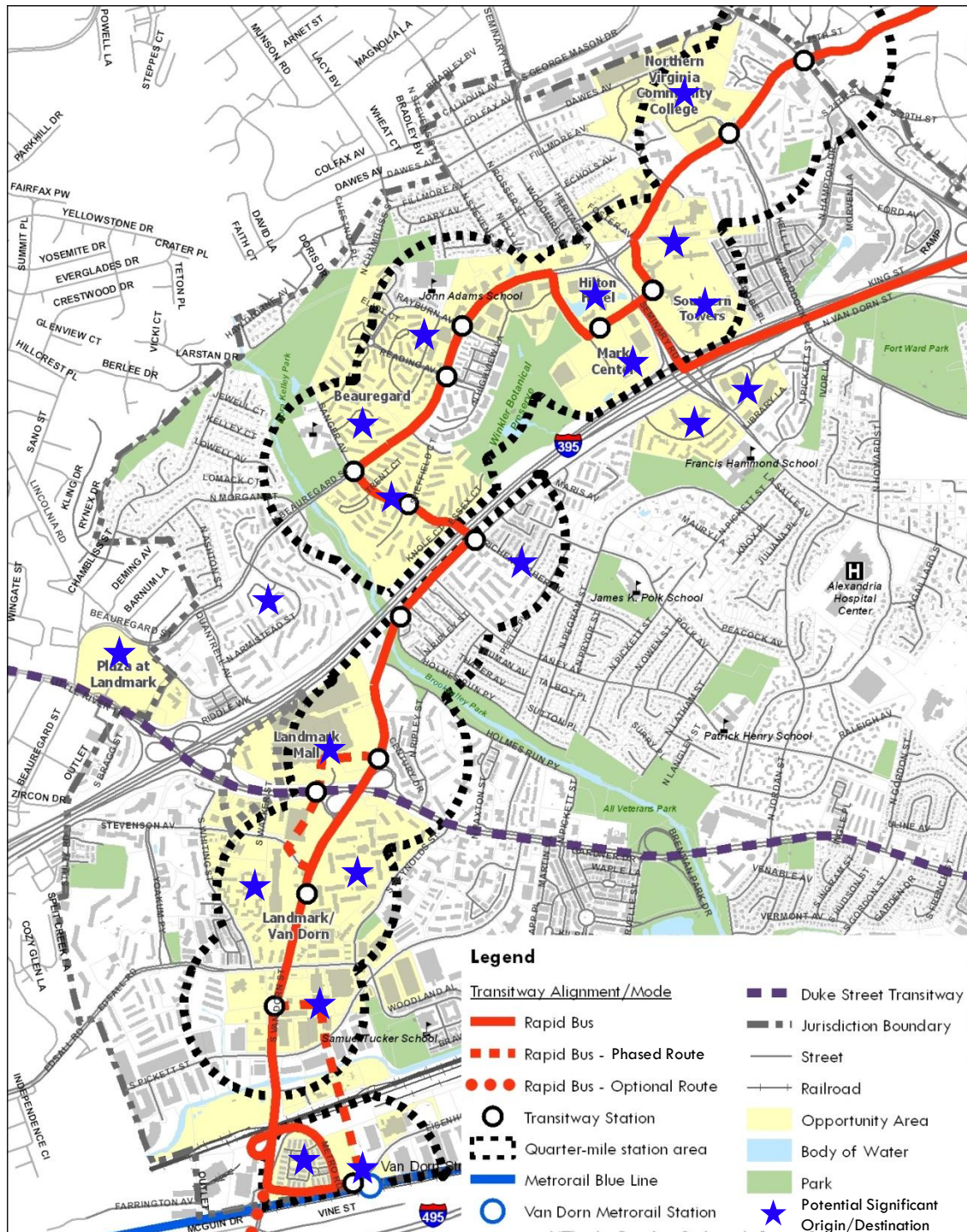


Alternative A: Streetcar in Mixed Flow Connecting to Columbia Pike

- Streetcar in mixed flow
- Extension of Columbia Pike
- Directly connects to Mark Center, Southern Towers, and Columbia Pike
- Quarter-mile station spacing
- Alternative long-term alignments along multimodal bridge to Van Dorn Metrorail Station
- Optional Rapid Bus extension to Kingstowne

Preliminary Screening Criteria	Rating
Service to Regional Destinations	●
Service to Population, Employment, & Retail in the Corridor	●
Transit Connectivity	●
Transit Travel Times	○
Alignment Quality	●
Property Impacts	●
Traffic Flow Impact	○
Capital Cost	○
Preliminary Opinion of Probable Cost * (capital cost, based on modal cost per-mile within the City)	\$90M
Rating:	<div>● Best</div> <div>● Fair</div> <div>○ Poor</div>

*Opinions of probable cost are shown in year 2010 dollars and do not include additional contingency or escalation to a future year mid-point of construction. Totals listed do not include costs for initial (or programmed replacement) vehicle purchases, maintenance facilities, right-of-way acquisition (including any condemnation, damages, or relocation costs), major utility relocations/new service, or roadway/streetscape improvements that may be implemented concurrently, but are not required for the transit project. Alignments designated as "optional" are not included in the cost.

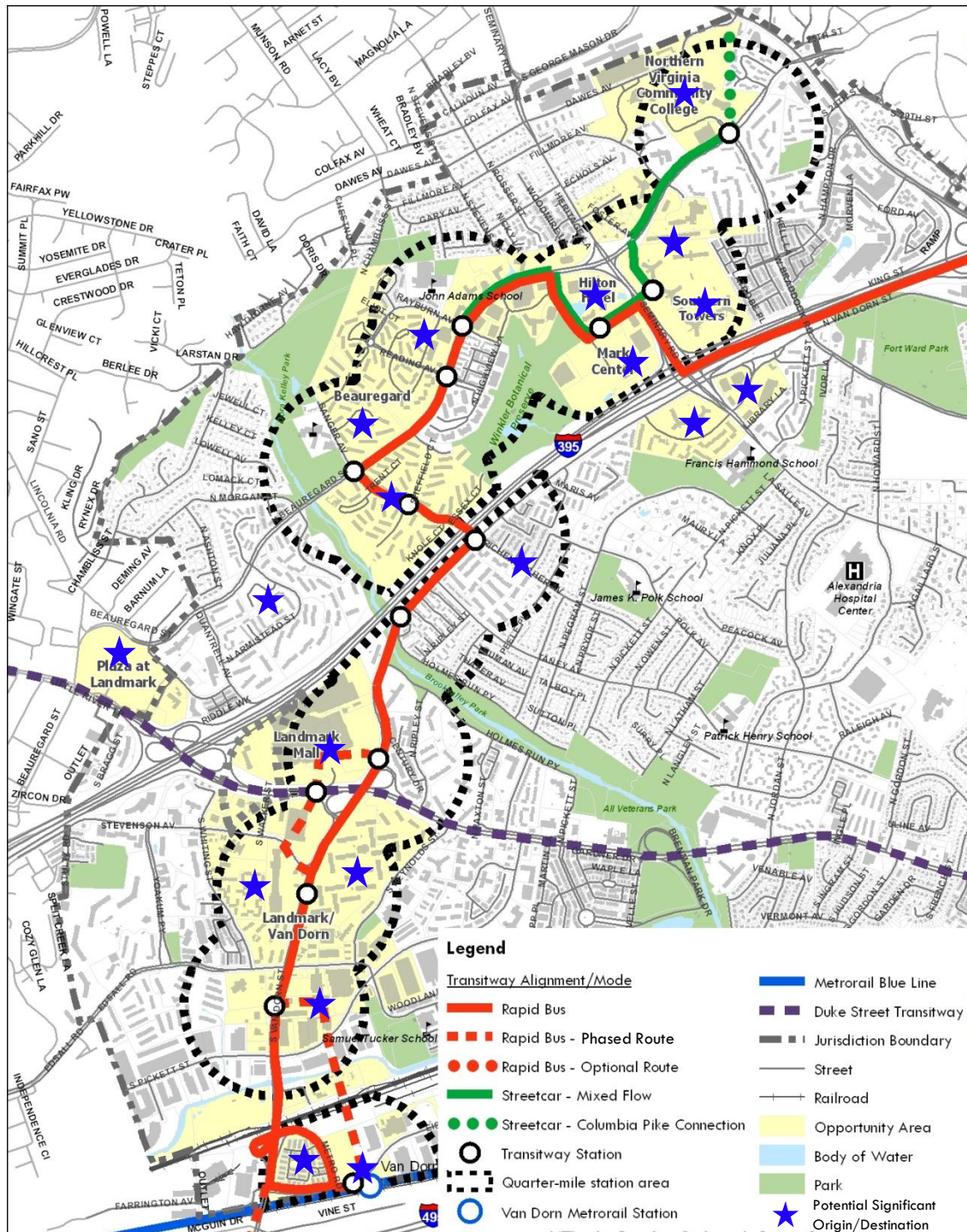


Alternative B: Rapid Bus in Mixed Flow Connecting to the Pentagon and Shirlington

- Rapid Bus in mixed flow
- Directly connects to Shirlington, the Pentagon, Mark Center, and Southern Towers
- Quarter-mile station spacing
- Alternative long-term alignments along Multimodal Bridge to Van Dorn Metrorail Station
- Optional Rapid Bus extension to Kingstowne

Preliminary Screening Criteria	Rating
Service to Regional Destinations	●
Service to Population, Employment, & Retail in the Corridor	●
Transit Connectivity	●
Transit Travel Times	●
Alignment Quality	●
Property Impacts	●
Traffic Flow Impact	●
Capital Cost	●
Preliminary Opinion of Probable Cost * (capital cost, based on modal cost per-mile within the City)	\$15M
Rating:	<div>● Best</div> <div>● Fair</div> <div>○ Poor</div>

**Opinions of probable cost are shown in year 2010 dollars and do not include additional contingency or escalation to a future year mid-point of construction. Totals listed do not include costs for initial (or programmed replacement) vehicle purchases, maintenance facilities, right-of-way acquisition (including any condemnation, damages, or relocation costs), major utility relocations/new service, or roadway/streetscape improvements that may be implemented concurrently, but are not required for the transit project. Alignments designated as "optional" are not included in the cost.*



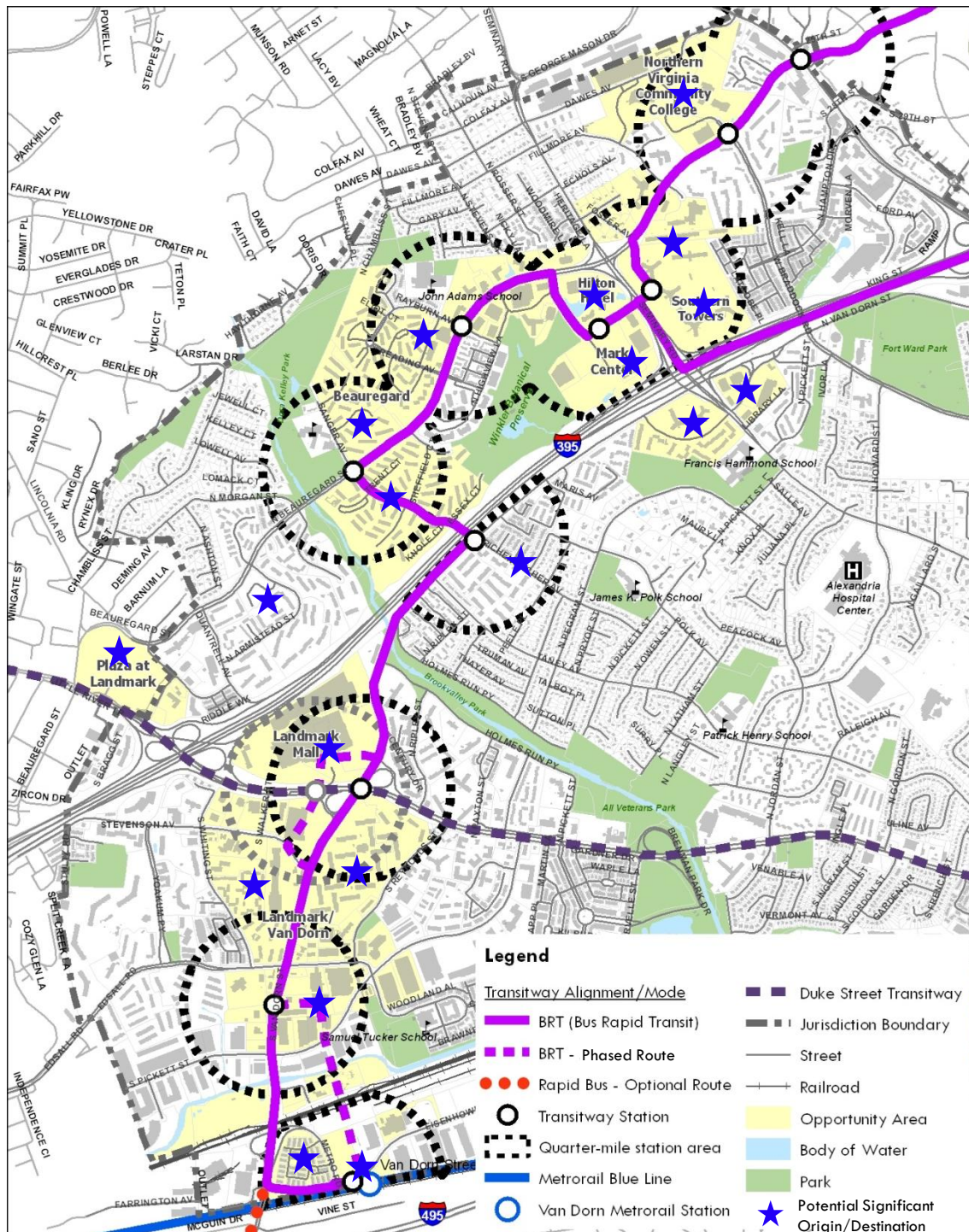
Alternative C: Rapid Bus in Mixed Flow Connecting to the Pentagon and Streetcar in Mixed Flow Connecting to Beauregard Town Center

- Mixed mode option (Streetcar and Rapid Bus)
- Direct connection to the Pentagon, Mark Center, Southern Towers, and Columbia Pike
- Quarter-mile station spacing
- Alternative long-term alignments along multimodal bridge to Van Dorn Metrorail Station
- Optional Rapid Bus to Kingstowne

Preliminary Screening Criteria	Rating
Service to Regional Destinations	●
Service to Population, Employment, & Retail in the Corridor	●
Transit Connectivity	●
Transit Travel Times	◐
Alignment Quality	◐
Property Impacts	●
Traffic Flow Impact	◐
Capital Cost	◐
Preliminary Opinion of Probable Cost * (capital cost, based on modal cost per-mile within the City)	\$40M
Rating:	<div>● Best</div> <div>◐ Fair</div> <div>○ Poor</div>

*The impact to property and to vehicular capacity will depend on whether an existing vehicular lane is displaced or a new transit lane is provided. This rating assumes a new transit lane is provided.

**Opinions of probable cost are shown in year 2010 dollars and do not include additional contingency or escalation to a future year mid-point of construction. Totals listed do not include costs for initial (or programmed replacement) vehicle purchases, maintenance facilities, right-of-way acquisition (including any condemnation, damages, or relocation costs), major utility relocations/new service, or roadway/streetscape improvements that may be implemented concurrently, but are not required for the transit project. Alignments designated as "optional" are not included in the cost.



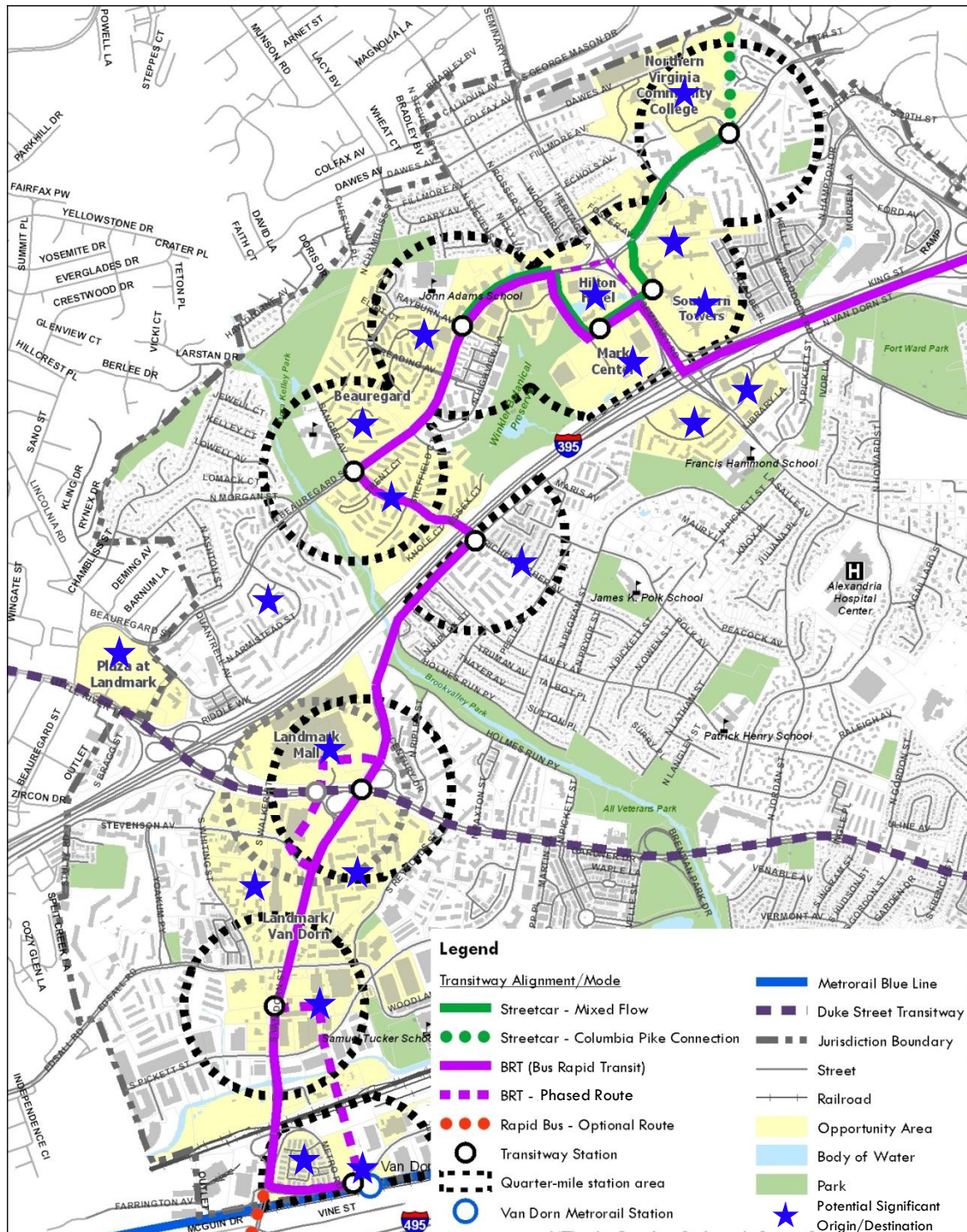
Alternative D: Bus Rapid Transit Connecting to the Pentagon and Shirlington

- BRT in combination of mixed flow and dedicated lanes
- Directly connects to Shirlington, the Pentagon, Mark Center, and Southern Towers
- Half-mile station spacing
- Alternative long-term alignments along multimodal bridge to Van Dorn Metrorail Station
- Optional Rapid Bus extension to Kingstowne

Preliminary Screening Criteria	Rating
Service to Regional Destinations	●
Service to Population, Employment, & Retail in the Corridor	●
Transit Connectivity	●
Transit Travel Times	●
Alignment Quality	●
Property Impacts*	●
Traffic Flow Impact*	●
Capital Cost	●
Preliminary Opinion of Probable Cost ** (capital cost, based on modal cost per-mile within the City)	\$50M
Rating:	<div>● Best</div> <div>● Fair</div> <div>○ Poor</div>

*The impact to property and to vehicular capacity will depend on whether an existing vehicular lane is displaced or a new transit lane is provided. This rating assumes a new transit lane is provided.

**Opinions of probable cost are shown in year 2010 dollars and do not include additional contingency or escalation to a future year mid-point of construction. Totals listed do not include costs for initial (or programmed replacement) vehicle purchases, maintenance facilities, right-of-way acquisition (including any condemnation, damages, or relocation costs), major utility relocations/new service, or roadway/streetscape improvements that may be implemented concurrently, but are not required for the transit project. Alignments designated as "optional" are not included in the cost.



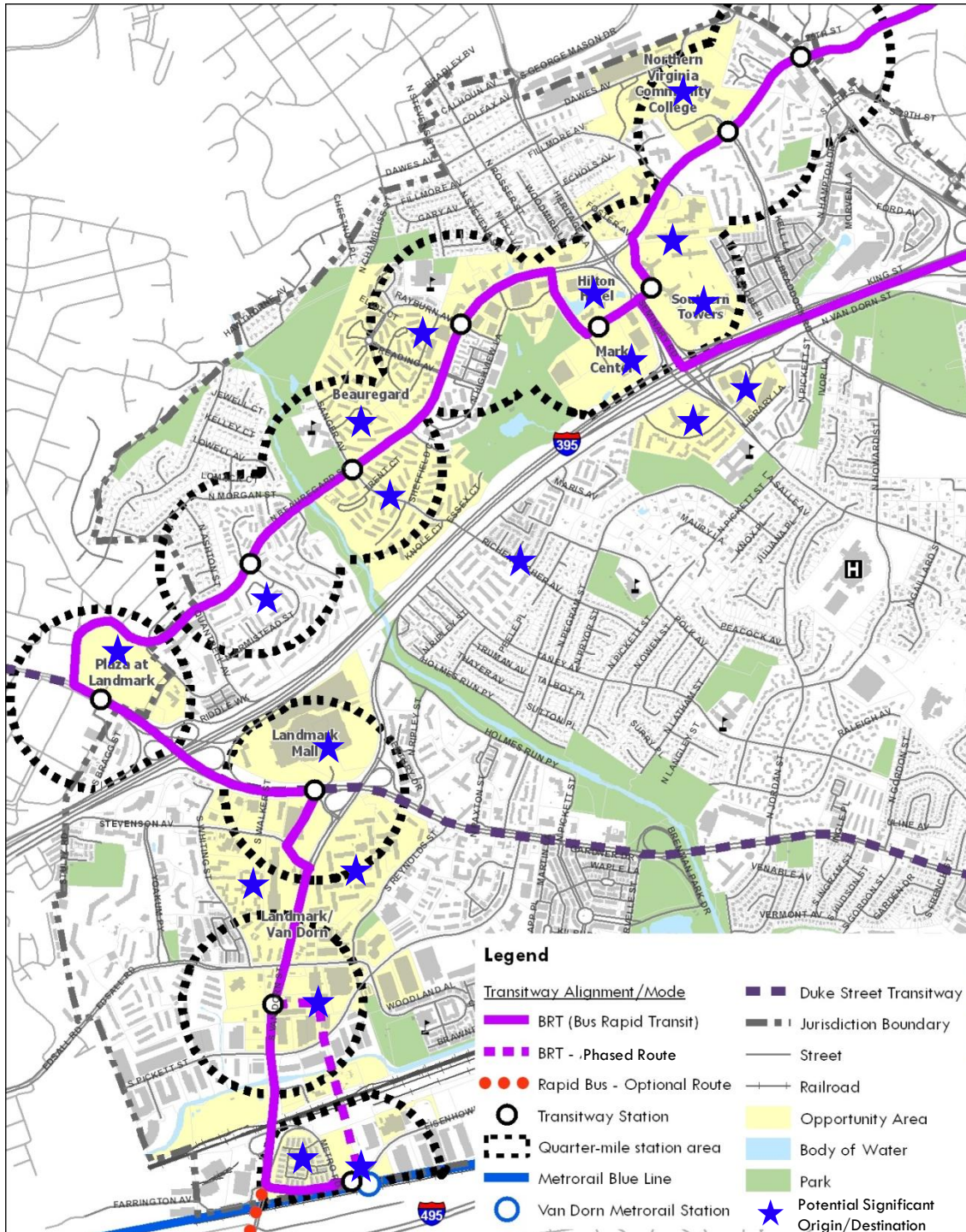
Alternative E: Bus Rapid Transit Connecting to the Pentagon and Streetcar in Mixed Flow Connecting to Beauregard Town Center

- Mixed mode option (Streetcar and Bus Rapid Transit)
- BRT and streetcar in mixed flow and dedicated lanes
- Directly connects to the Pentagon, Mark Center, Southern Towers, and Columbia Pike
- Quarter-mile station spacing
- Alternative long-term alignments along multimodal bridge to Van Dorn Metrorail Station
- Optional Rapid Bus to Kingstowne

Preliminary Screening Criteria	Rating
Service to Regional Destinations	●
Service to Population, Employment, & Retail in the Corridor	◐
Transit Connectivity	●
Transit Travel Times	●
Alignment Quality	◐
Property Impacts*	◐
Traffic Flow Impact*	●
Capital Cost	◐
Preliminary Opinion of Probable Cost ** (capital cost, based on modal cost per-mile within the City)	\$65M
Rating:	<div>● Best</div> <div>◐ Fair</div> <div>○ Poor</div>

*The impact to property and to vehicular capacity will depend on whether an existing vehicular lane is displaced or a new transit lane is provided. This rating assumes a new transit lane is provided.

**Opinions of probable cost are shown in year 2010 dollars and do not include additional contingency or escalation to a future year mid-point of construction. Totals listed do not include costs for initial (or programmed replacement) vehicle purchases, maintenance facilities, right-of-way acquisition (including any condemnation, damages, or relocation costs), major utility relocations/new service, or roadway/streetscape improvements that may be implemented concurrently, but are not required for the transit project. Alignments designated as "optional" are not included in the cost.



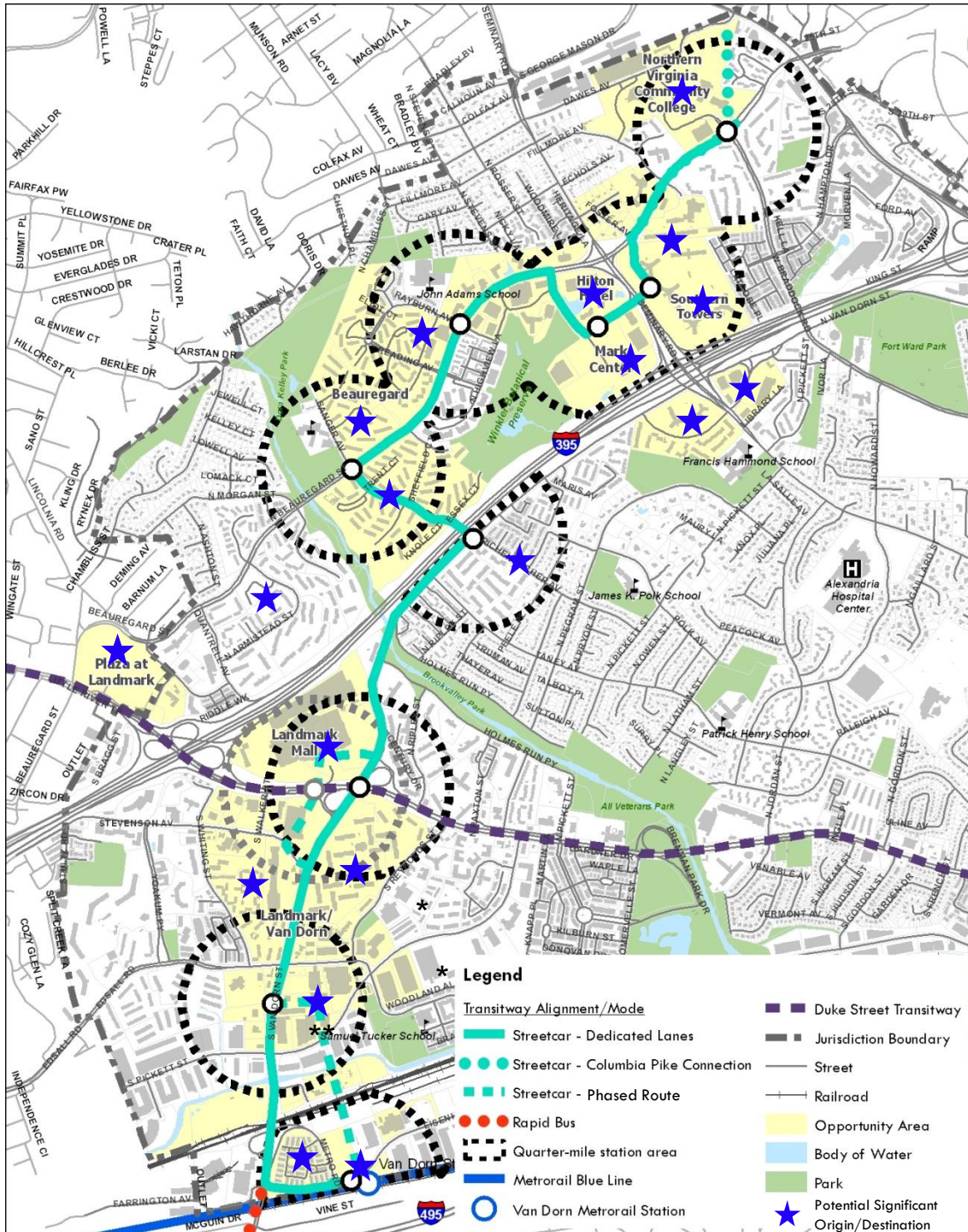
Alternative F: Bus Rapid Transit Connecting to the Pentagon and Shirlington

- BRT in mixed flow and dedicated lanes
- Directly connects to Shirlington, the Pentagon, Mark Center, and Southern Towers
- Travels along congested Little River Turnpike west of I-395
- Avoids Sanger Ave/I-395 crossing
- Half-mile station spacing
- Alternative long-term alignments along multimodal bridge to Van Dorn Metrorail Station
- Optional Rapid Bus extension to Kingstowne

Preliminary Screening Criteria	Rating
Service to Regional Destinations	●
Service to Population, Employment, & Retail in the Corridor	○
Transit Connectivity	●
Transit Travel Times	●
Alignment Quality	○
Property Impacts*	●
Traffic Flow Impact*	●
Capital Cost	●
Preliminary Opinion of Probable Cost ** (capital cost, based on modal cost per-mile within the City)	\$55M
Rating:	<div>● Best</div> <div>● Fair</div> <div>○ Poor</div>

*The impact to property and to vehicular capacity will depend on whether an existing vehicular lane is displaced or a new transit lane is provided. This rating assumes a new transit lane is provided.

**Opinions of probable cost are shown in year 2010 dollars and do not include additional contingency or escalation to a future year mid-point of construction. Totals listed do not include costs for initial (or programmed replacement) vehicle purchases, maintenance facilities, right-of-way acquisition (including any condemnation, damages, or relocation costs), major utility relocations/new service, or roadway/streetscape improvements that may be implemented concurrently, but are not required for the transit project. Alignments designated as "optional" are not included in the cost.



Alternative G: Streetcar in Dedicated Lanes Connecting to Columbia Pike

























































- Streetcar in dedicated lanes
- Extension of Columbia Pike
- Directly connects to Mark Center, Southern Towers, and Columbia Pike
- Quarter-mile station spacing
- Alternative long-term alignments along multimodal bridge to Van Dorn Metrorail Station
- Optional Rapid Bus extension to Kingstowne

Preliminary Screening Criteria	Rating
Service to Regional Destinations	●
Service to Population, Employment, & Retail in the Corridor	●
Transit Connectivity	●
Transit Travel Times	●
Alignment Quality	●
Property Impacts*	○
Traffic Flow Impact*	●
Capital Cost	○
Preliminary Opinion of Probable Cost ** (capital cost, based on modal cost per-mile within the City)	\$180M
Rating:	<div> <div>●</div> <div>Best</div> <div>●</div> <div>Fair</div> <div>○</div> <div>Poor</div> </div>

*The impact to property and to vehicular capacity will depend on whether an existing vehicular lane is displaced or a new transit lane is provided. This rating assumes a new transit lane is provided.

**Opinions of probable cost are shown in year 2010 dollars and do not include additional contingency or escalation to a future year mid-point of construction. Totals listed do not include costs for initial (or programmed replacement) vehicle purchases, maintenance facilities, right-of-way acquisition (including any condemnation, damages, or relocation costs), major utility relocations/new service, or roadway/streetscape improvements that may be implemented concurrently, but are not required for the transit project. Alignments designated as "optional" are not included in the cost.

Preliminary Evaluation Summary

Preliminary Screening Criteria	Alternative						
	A	B	C	D	E	F	G
Transit Mode:	Streetcar (mixed)	Rapid Bus (mixed)	Streetcar (mixed) & Rapid Bus (mixed)	BRT (mixed & dedicated)	Streetcar (mixed) & BRT (mixed & dedicated)	BRT (mixed & dedicated)	Streetcar (dedicated)
Northern Connection:	Columbia Pike	Shirlington & Pentagon	Columbia Pike & Pentagon	Shirlington & Pentagon	Columbia Pike & Pentagon	Shirlington & Pentagon	Columbia Pike
Service to Regional Destinations							
Service to Population, Employment, & Retail in the Corridor							
Transit Connectivity							
Transit Travel Times							
Alignment Quality							
Property Impacts							
Traffic Flow Impact							
Capital Cost							
Prelim. Opinion of Probable Cost * (capital cost, based on modal cost per-mile within the City)	\$90M	\$15M	\$40M	\$50M	\$65M	\$55M	\$180M

Rating:  Best  Fair  Poor

*Opinions of probable cost are shown in year 2010 dollars and do not include additional contingency or escalation to a future year mid-point of construction. Totals listed do not include costs for initial (or programmed replacement) vehicle purchases, maintenance facilities, right-of-way acquisition (including any condemnation, damages, or relocation costs), major utility relocations/new service, or roadway/streetscape improvements that may be implemented concurrently, but are not required for the transit project. Alignments designated as "optional" are not included in the cost.

Discussion

- Thank you for your attention!
- Questions and Discussion

For access to the information that was presented tonight, as well as other study information, please visit the project website at: <http://alexandriava.gov/HighCapacityTransit>

Once there, follow the link for the [“High Capacity Transit Corridor Work Group”](#)